Abstract Submitted
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Using vibrational Cooper minima to determine strong-field molecular-dissociation pathways[1] T. SEVERT, M. ZOHRABI, G.S.J. ARMSTRONG, J. MCKENNA, B. GAIRE, NORA G. KLING, U. ABLIKIM, K.D. CARNES, B.D ESRY, I. BEN-ITZHAK, J.R. Macdonald Laboratory, Physics Department, Kansas State University, Manhattan, KS 66506, USA — We explore the possibility of using vibrational "Cooper minima" (VCM) locations as a method to determine dissociation pathways of molecules in a strong laser field. As a test case, we study the laser-induced dissociation of an O_2^+ ion beam by several wavelengths ($\lambda = 800$, 400, and 266 nm) using a coincidence three-dimensional momentum imaging technique. Vibrational structure is observed in the kinetic energy release spectra, revealing a suppression of the dissociation of certain vibrational levels, which is a manifestation of the VCM effect. Previously, it has been shown in H_2^+ that first-order time-dependent perturbation theory can be used to predict the locations of the VCM [1]. We explore if the VCM locations predicted by perturbation theory can help uniquely identify dissociation pathways in O_2^+ and consider its utility for other systems.

[1] J. McKenna et. al., Phys. Rev. Lett. 103, 103006 (2009).

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